MRI/MRS Strategy Group Meeting on Translational Research in Cancer Kyoto, Japan, May 19, 2004

Background:

Recent advances in Magnetic Resonance Imaging and Spectroscopy are having a significant impact on cancer detection, diagnosis, image-guided intervention, and assessment of drug therapy for cancer. New developments such as those in the area of DCE-MRI and Proton MR Spectroscopy and Spectroscopic Imaging need to be evaluated and validated through multi-center clinical trials, and their dissemination into clinical practice needs to be accelerated if appropriate. There is therefore a need to support multi-disciplinary academic and industrial research teams for the development, optimization, and validation needed for regulatory approvals and broad dissemination. Perhaps one of the most important issues facing us is how our community can collectively address the issues of translation and implementations of these promising techniques and methodologies, and move them forward to become vital tools for multi-center clinical trials.

Goals of the meeting:

The National Cancer Institute's Cancer Imaging Program's ultimate goal is to move recent developments in MRI/MRS from the current status of isolated developments of clinical applications into readily applied, robust, and widely accessible clinical tools. The purpose of this NCI meeting is to help plan and strategize how to move the field toward translational research and clinical utilization, assess current developments and their application to oncology, and identify barriers for their translation and implementation in multi-center clinical trials

Objectives of the meeting:

To engage investigators from academia and industries to help:

- 1. Identify current and future clinical opportunities for MRI/MRS in cancer research,
- 2. Identify the technological challenges that need to be met to address these clinical opportunities,
- 3. Assess current development, underlying technological requirements, and their validation for a) DCE-MRI for drug development and assessments of cancer therapies; and b) Proton MRS for cancer diagnostics, disease progression, and treatment monitoring,
- 4. Develop a consensus on standardized methods across platforms and vendors to facilitate the analysis of clinical trial outcomes with sufficient validity to achieve recognition by regulatory and reimbursement bodies.
- 5. Develop a plan to engage both the device and drug industries in establishing a network similar to NTROI and LIDC that would bring members of the several

communities together to share data and methodologies, and leverage resources and funding through public-private partnerships.

Meeting Report

Agenda:

Guoying Liu: Introduction and charge to meeting participants

Michael Knopp: DCE-MRI and cancer therapy assessment; the importance of

public-private partnership to leverage support

Michael Garwood: MRS and breast cancer, opening with the recent CTEP review he

received, and stressing the need to validate MRS as biomarker, to

move it beyond the category of a "novel technique".

Jeff Evelhoch: DCE-MRI, drug company's perspectives

Daniel Vigneron: MRSI and prostate cancer clinical trials; he discussed his

experience in the 7 site ACRIN trial

Overall assessment:

It was a very active and useful discussion. The participants, from both academia and industry, have each expressed their strong desire to work together and to address the issue of translation and implementation. Our goal is to move the MRI field forward to become vital tools for multi-center oncologic clinical trials. The enthusiasm and dedication of the attendees was inspiring.

Note that the focus was not on NIH funding opportunities, which the participants all understood very well from the letter I sent out before the meeting.

Issues discussed:

There is a need to balance between pushing the technical envelope (for data acquisition: higher temporal and spatial resolution, better coverage etc., and for data analysis: evaluating sophisticated models, such as the Shutter-Speed model Charlie Springer developed) and the reality of implementation in many sites.

Database issue for DCE-MRI: drug companies' current clinical trials data could be made available for algorithm testing (it is extensively discussed; there is some willingness to share data expressed by Pfizer and Novartis representatives). NIH needs to lay out specifics on requirement for data-sharing (a trans-NIH issues)

Clinical trials issues, of MR and using MR:

There is a need to separately evaluate the use of MR for: diagnostics, disease progression, and as biomarker for drug development and assessment of cancer therapies.

It is important to get MR imaging included clinical trials and to raise the consciousness of CTEP about the utility of MR techniques.

Put other imaging modalities, such as FDG PET in perspective.

Most of the group felt there should be a concentration on separately assessing different organ systems, while others felt that that oncologists care about metastases, not organ system, stressing the need for assessing therapy in metastastic areas.

It was suggested to combine DCE-MRI with MRS.

There are field strength issues, difference in reality between DCE-MRI, which is mostly done at 1.5 T, and MRS, where there is a trend to use 3T.

Standardization in data acquisition, analysis, and presentation, across platforms and across vendors was discussed. It is not even present in all NIH-sponsored trials. Ther may need to be a technique team to travel from site to site for standardization and quality controls. Standardization is needed for implementation of MR techniques in clinical trials: some participants described experiences of getting bad data even for the simplest techniques and protocols. There is a reliance on the site investigators and how they implement the protocols. It will be important to train MR technologists and physicians who are the ones actually execute protocols and oversee clinical trials.

Device industry issues:

Investigators see a need for industry members to work together

Public-private partnerships would leverage support for research

Device industry participants expressed their interests and also their constraints; there is competition for resources within the company and the use of resources has to be in accord with the business plan. In reality, the device industry can not afford to provide a field engineer on every site.

There were legal issues raised by industry; the group wanted NIH to serve as interface/mediator.

Overall, there need to be number of demonstrative projects.

Recommendations:

- All expressed appreciation to NCI for leading and coordinating the efforts to begin public discussion of these topics.
- Workshop; A workshop should be planned to continue this discussion to generate/agree on a plan and ways to get it done.

- Workshop Timing September in DC area to allow more NCI attendance or October at ISMRM cancer focus group meeting in Manchester. (The date is set now in early November in the Washington DC area.)
- Workshop Organization: The workshop needs to be organized around two sets of issues:
 - 1) scientific,
 - 2) structural (facilitating industry cooperation, which is also a NIBIB interest)
- Session topics: The topics should keep the two major methodologies in mind, with the timing organized in thusly (no parallel sessions so some can participate in all sessions):
 - 1) Session 1: DCE-MRI,
 - 2) Overlapping session on facilitating industry cooperation,
 - 3) Session 3: MRS.

Participants in Kyoto Meeting

Co-Chairs:

Garwood, Michael, Ph.D. Knopp, Michael, M.D. Ph.D.

From Academia:

Shields, Anthony, M.D., Ph.D.

Kurhanewicz, John, Ph.D.

Vigneron, Daniel, Ph.D.

Bhujwalla, Zaver, Ph.D.

Leech, Martin, Ph.D.

Griffiths, John, Ph.D.

Springer, Charles, Ph.D.

Hylton, Nola, Ph.D.

Heerschap, Arend, Ph.D.

Nelson, Michael, M.D.

Essig, Marco, M.D.

Rothman, Douglas, Ph.D.

Kelcz, Frederick, M.D., Ph.D..

From NIH:

Liu, Guoying NCI
McLaughlin, Alan NIBIB
Choyke, Peter, M.D. NCI
Thomasson, David, Ph.D. NCI

From Industry:

Cole, Patricia, M.D., Ph.D.
Evelhoch, Jeffrey, Ph..D.
McShane, Teresa, Ph.D.
Waterton, John, Ph.D.
Caruthers, Shelton, Ph.D.
Kiefer, Berthold,
Novartis
Pfizer
AstraZeneca
Philips
Siemens

Kelly, Douglas, Ph.D.	GE
Dumoulin, Chuck, Ph.D.	GE
Knowels, Adrian, Ph.D.(?)	GE
Kohler, Susan, PhD.	GE